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High school student discovers skeleton of baby dinosaur

In a first, all the digital materials are being made accessible and freely available to the public

Claremont, CA – A chance find by a high school student led to the youngest, smallest and most complete fossil skeleton yet known from the iconic tube-crested dinosaur *Parasaurolophus*. The discovery, announced today by the Raymond M. Alf Museum of Paleontology at The Webb Schools, shows that the prehistoric plant-eater sprouted its strange headgear before it celebrated its first birthday. Three-dimensional scans of nearly the entire fossil, alongside many other materials are freely available online (using a Creative Commons license), making this the most digitally-accessible dinosaur ever.

The fossil skeleton was discovered in 2009 by high school student Kevin Terris, within Grand Staircase-Escalante National Monument in southern Utah. Incredibly, the specimen was missed by two professional paleontologists, who walked within several feet of the exposed bones days prior to the discovery. “At first I was interested in seeing what the initial piece of bone sticking out of the rock was,” commented Terris. “When we exposed the skull, I was ecstatic!” Excavation and subsequent cleaning of the fossil, nicknamed “Joe” after a long-time supporter of the Alf Museum whose family funded preparation of the fossil, revealed nearly the entire skeleton of a baby dinosaur measuring only six feet long when it died.

Detailed study of the skeleton of “Joe” identified it as the most complete specimen yet known for *Parasaurolophus* (pronounced PAIR-uh-SORE-AH-luf-us), a duck-billed (hadrosaurid) dinosaur that lived throughout western North America around 75 million years ago. The herbivore is notable for a long and hollow bony tube on the top of its skull, which scientists speculate was used like a trumpet to blast sound for communication, as well as a billboard for visual display. Although partial skulls and skeletons of full-grown *Parasaurolophus* have been known for over 90 years, scientists previously knew little about how *Parasaurolophus* grew up.

Intriguingly, the new fossil shows that baby *Parasaurolophus* had a low bump on top of its head, which only later morphed into the curved tube of adults. “Our baby *Parasaurolophus* is barely one-quarter of adult size, but it had already started growing its crest,” stated lead project scientist Andrew Farke, who is Augustyn Family Curator at the Raymond M. Alf Museum of Paleontology. “This is surprising, because related dinosaurs didn’t sprout their ornamentation until they were at least half-grown. *Parasaurolophus* had to get an early start in order to form its unique headgear.”

A sample of bone from the leg helped estimate the animal's age at death. "Dinosaurs have yearly growth rings in their bone tissue, like trees. But we didn't see even one ring. That means it grew to a quarter of adult size in less than a year," commented co-author Sarah Werning of Stony Brook University. Although "Joe" was only six feet long and a year old, it would have grown to 25 feet in length as an adult.

The fossil skeleton has yielded a world of previously unknown information about *Parasaurolophus* and its relatives. Medical scans documented the internal anatomy of the animal's skull, allowing a reconstruction of its vocal capabilities. "If adult *Parasaurolophus* had 'woofers,' then the babies had 'tweeters.' The short and small crest of baby 'Joe' shows that it may have had a much higher pitch to its call than did adults," stated Andrew Farke. "Along with the visual differences, this might have helped animals living in the same area to figure out who was the big boss."

Because of the broad importance of the fossil, researchers have made 3D digital scans of the entire fossil freely available on-line (links via www.dinosaurjoe.com). Although portions of other dinosaur fossils have been scanned and distributed in this way before, this the first time that virtually an entire skeleton has been posted. This will allow scientists and the public alike unparalleled access to this fossil.

The study describing the new fossil was published today in the open access scientific journal *PeerJ* (meaning that anyone can read and download the article for free, and without restrictions) and can be accessed at https://peerj.com/articles/182/. Additionally, the specimen is now on exhibit at the Raymond M. Alf Museum of Paleontology in Claremont, California. Researchers who co-authored the study include Andrew Farke (Raymond M. Alf Museum of Paleontology, Claremont, California), Sarah Werning (University of California Museum of Paleontology, Berkeley, and Stony Brook University, New York), and high school students Derek Chok, Annisa Herrero, and Brandon Scolieri (The Webb Schools, Claremont, California). The fossil was collected under a permit from Grand Staircase-Escalante National Monument and the Bureau of Land Management, Utah.

DISCOVERY BRIEF:

- The fossil, nicknamed "Joe", was found by a high school student in Grand Staircase-Escalante National Monument in southern Utah.
- "Joe" is a baby *Parasaurolophus*, the most complete skeleton yet known from this iconic hadrosaur that lived 75 million years ago.
- "Joe" was less than six feet long and under a year old when it died, and would have grown to an adult measuring nearly 25 feet long.
- "Joe" shows that *Parasaurolophus* formed its unusual headgear by expanding some of its skull bones earlier and for a longer period of time than its close relatives.
- The fossil includes rare soft-tissue impressions, from the skin and keratinous beak.
- The skeleton of "Joe" is the most complete digitally-accessible dinosaur to date, with 3D

models and scans of virtually every aspect of its anatomy freely available for download.

- High school students were involved in the collection, study, and publication of this rare find, through the Raymond M. Alf Museum of Paleontology at The Webb Schools in Claremont, California.
- Fittingly, given the fact that the materials are being made 'maximally open' this article publishes in the middle of 'Open Access Week' (a world-wide celebration of open access journal publishing) and so demonstrates the power of making this material openly available.
- The entire history of the original submission; peer-reviews; decision(s) by the handling Editor; author rebuttals to the reviews; revisions etc are being made publicly available (as part of PeerJ's normal process of making this material public).

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ABOUT:

The **Raymond M. Alf Museum of Paleontology** (www.alfmuseum.org) is the only nationally accredited museum located on a secondary school campus—The Webb Schools. The vision for the museum was born on a camping trip in 1936 led by the late Raymond Alf, a Webb biology teacher with a penchant for searching for fossils. Today the museum holds over 140,000 specimens, with exhibits divided into the "Hall of Life," which traces the history of earth from the first cells through human civilization, and the "Hall of Footprints," which holds the most diverse display of fossilized animal tracks in the United States. Donald Lofgren is Director of the Alf Museum.

The Webb Schools (www.webb.org) is a unique boarding and day secondary school located in Claremont, California. It began in 1922 with the founding of Webb School of California for boys. In 1981, Vivian Webb School for girls was established, instituting the schools' special coordinate, two-schools-on-one-campus structure. Webb is well known for the success of its alumni across many fields of endeavor, as well as for its rigorous academic program, devotion to discovery learning and unbounded thinking, and for consistently producing a placement record to colleges and universities with few rivals. Taylor Stockdale is Head of Schools.

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Link to the Published Version of the article (quote this link in your story – the link will ONLY work after the embargo lifts): https://peerj.com/articles/182 - your readers will be able to **freely** access this article at this URL.

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Citation to the article: Farke, A. A., D. J. Chok, A. Herrero, B. Scolieri, and S. Werning. 2013. Ontogeny in the tube-crested dinosaur *Parasaurolophus* (Hadrosauridae) and heterochrony in hadrosaurids. *PeerJ* 1:e182. http://dx.doi.org/10.7717/peerj.182

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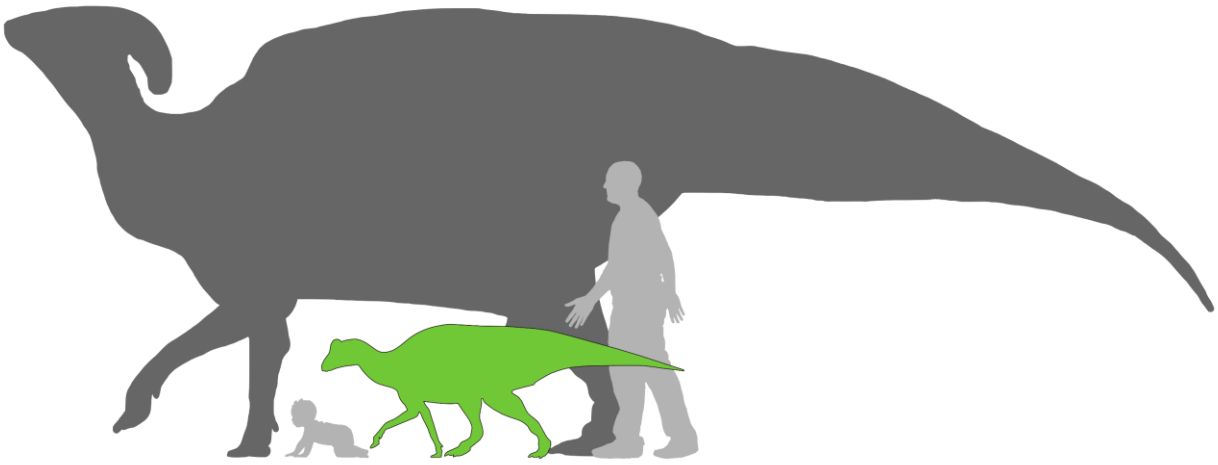
IMAGES:



Caption: Comparison of the size of the baby Parasaurolophus (green) to adult Parasaurolophus, as well as an adult and baby human
Credit: Scott Hartman, Matt Martyniuk, and Raymond M. Alf Museum of Paleontology
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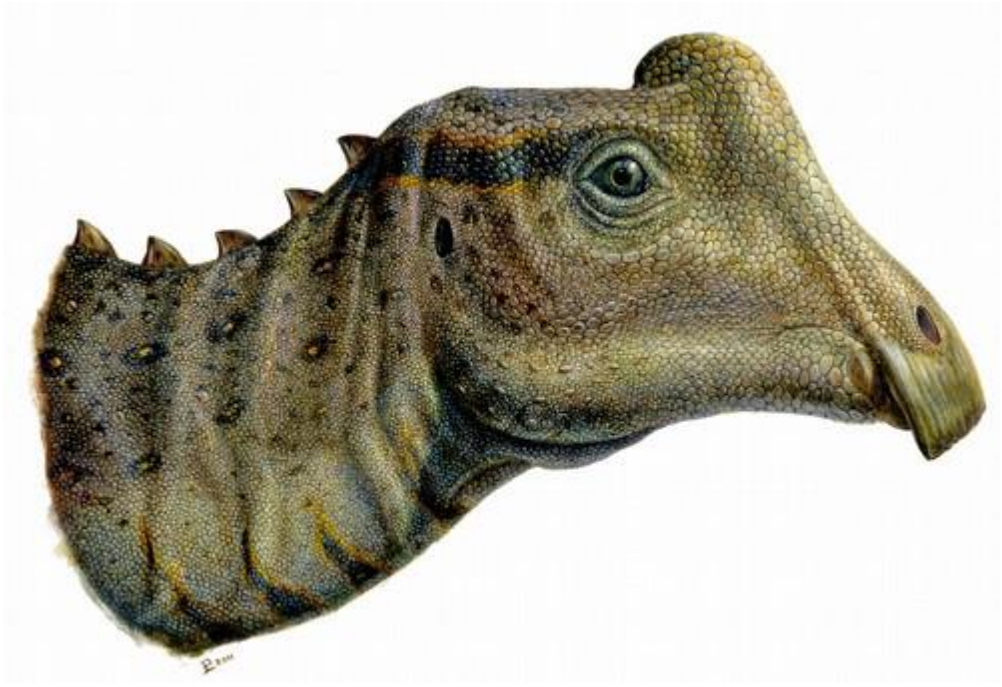
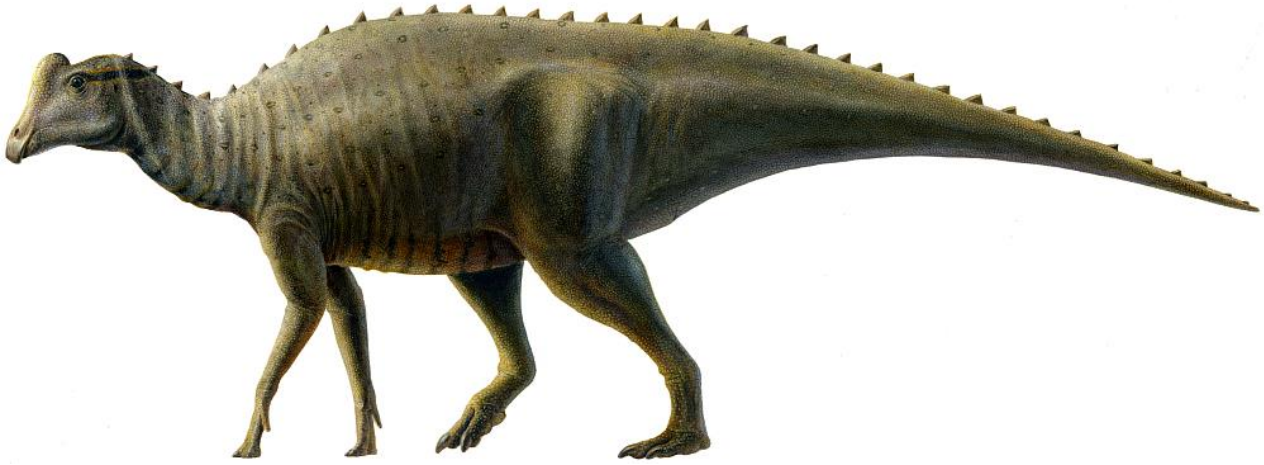
Caption: The skeleton of the baby Parasaurolophus nicknamed “Joe”
Credit: Raymond M. Alf Museum of Paleontology Usage Restrictions:CC-BY



Caption: An artist rendition of the head of the baby Parasaurolophus
Credit: Lukas Panzarin
Usage Restrictions: Image to be used in relation to the content of the press release.



Caption: Artist's reconstruction of baby Parasaurolophus.
Credit: Copyright Lukas Panzarin.
Usage restrictions: This image may be used by news organizations in reports describing the research of Farke and colleagues on baby Parasaurolophus.

ADDITIONAL VISUAL MEDIA PACKAGE AVAILABLE

(please request these materials from the author - afarke@webb.org)

Video: Helicopter lift footage of specimen from field area
Interviews with students and researchers involved in the project
Digital B-Roll of site and surrounding landscape
3D digital model of living animal

Images: Photos of excavation site
Photos of skeleton and skull
Photos of project participants
Artist's renderings of the complete skeleton

Artist's renderings of the animal when it was alive
(Head of baby/comparison to adult)
(Full body)

Dedicated website (live after embargo lifts): www.dinosaurjoe.com

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